BIO MEDICAL WASTE MANAGEMENT

Status of

Bio-Medical Waste Management practices in Chennai

July - Sept 2001

Hands that HEAL & Hands that HARM

Citizen consumer and civic Action Group (CAG)

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and
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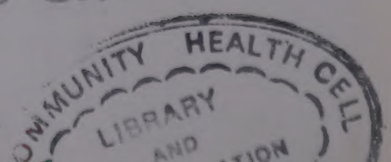

Citizen, consumer and civic Action Group (CAG)

About CAG

CAG is a non-profit, non-political, voluntary and professional citizens' group that works for the protection of the rights of consumers on various issues. CAG is also involved in the areas of corporate responsibility, transparency, public health and safety.

Though the group started as 'Consumer Action Group' in 1985, it became **Citizen, consumer and civic Action Group** in the early 1990's, keeping in mind the larger role that was required in the city of Chennai. Specifically, issues affecting the common citizen such as severe pollution, lack of urban planning, poor quality of health and poor civic amenities have emerged as priorities for CAG. The study on the status of bio-medical waste management in the city of Chennai has become one of CAG's focal areas of work.

CAG's contribution has been recognised by the Government of India who awarded them the National Award for Consumer Protection in 1989 (Second Prize) and 1991 (First Prize).

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Introduction:

Health is an area of immense importance to every individual and group in the country. However, while much emphasis and attention is given to the curing of diseases, little or no attention is paid to the treatment and management of bio-medical waste nor to its disposal and its relationship to infection and disease. Similarly, in hospitals while large amounts of funds are spent on providing state of the art infrastructure, surprisingly little importance is given to the treatment of potentially hazardous hospital waste. Ironically, though the best health care facilities are provided by these hospitals, their inadequate treatment of the waste generated presents a serious health hazard to not only patients but also the general public. Improper collection, treatment and disposal of hospital waste can lead to rapid spreading of infections and diseases, especially in city hospitals where the proximity of residential and other buildings to the areas where the waste is dumped is high. Personnel working in hospitals could in fact turn out to be the largest carriers of infection and disease, if adequate precautions are not taken and if waste is not treated before disposal.

In Phase I of CAG's Study on Bio Medical Waste Management in Chennai, a preliminary survey was conducted in May–June, 2000 along with the Delhi-based Srishti, who have been involved in this work extensively and helped install proper hospital waste management systems in many hospitals in Delhi. The preliminary survey showed that though hospitals are aware of the Bio-Medical Waste (Management and Handling) Rules, 1998, which details the manner in which bio-medical waste is to be collected, managed and disposed, few seem to actually implement these measures.

We compiled a report on the findings of our preliminary survey and sent it to all the hospitals that were covered under the survey. We were encouraged by the feedback and response from hospitals indicating their interest in implementing safer waste management and disposal measures in their hospitals. In Phase II of the Study, we decided to extend the survey to a larger number of hospitals and follow this up with a detailed workshop to disseminate the findings of the survey, and to focus on specific bio-medical waste management and disposal systems. Towards this, we developed a simple, yet comprehensive booklet on Bio Medical Waste Management practices as well as educational tools in the form of posters, to help hospitals train their staff in safer practices.

We have also got the booklet translated into Tamil, in order to be able to assist rural hospitals in Tamil Nadu to also shift to better management systems.

Objective:

The main objective behind this present study is to study the level of awareness of hospital staff and to critically evaluate the procedures being used presently in hospitals to collect, manage and dispose waste.

The short term objective of this programme is to inculcate the importance of worker safety, proper and hygienic waste disposal to hospitals. This we believe is the most important aspect of any waste disposal system, as staff and administration of hospitals should be aware of the hazards of improper disposal. Without the complete support of the hospital staff, it is impossible to implement an effective waste management system. We also hope to identify and resolve specific problems that persist with the present waste disposal systems as well as identify methods that can be used to upgrade existing systems.

In the long run, we hope to be able to effectively implement the Rules regarding the management of hospital waste and form a working committee consisting of healthcare service providers, waste

management experts, the government authorities as well as concerned groups like CAG and Srishti, that will monitor the working of these system, to ensure that the Hands that heal are not the hands that harm.

Methodology:

This year's survey includes a review of the performance of the hospitals included in last year's survey as well as an assessment of the practices followed in other hospitals in and around Chennai. The first set of hospitals surveyed therefore, were those that were covered under last year's survey.

This year the survey sample was aimed at covering atleast 50 healthcare service providers. The hospitals were first categorised into 4 main heads – Multi-speciality hospitals, Super specialities, Diagnostic Centres and Laboratories and Clinics. The first category was again subdivided into 2 categories – small and large Multi-speciality hospitals. This distinction has been made on the basis of the number of beds in these hospitals apart from the type of health problems dealt with by the hospital. Hospitals have been chosen based on these categories and an attempt has been made to choose as representative a sample as possible under each of these categories.

On choosing these hospitals, representatives from CAG were sent to each of these hospitals with the aim of conducting a detailed survey covering the following criteria:

- Level of awareness among staff.
- Segregation of waste.
- Transporting of waste.
- Pre-treatment of waste (wherever relevant)
- Final treatment of waste.
- Implementation of hospital practices on waste management by the staff and other personnel.
- The hospital's view on the proposed Centralised facility.

The level of awareness was judged based on the practices laid down by the hospital and the actual compliance of the hospital personnel especially those who handle the waste to these norms. The compliance to the norms was based on the practices followed by hospital staff at various hierarchical levels - including doctors, nurses, wardboys, housekeeping personnel, support staff and administrative staff in charge of monitoring the system.

Segregation of waste was assessed on the basis of the system followed in each hospital and those that have been prescribed in the Rules. Transportation of waste was assessed on the basis of the procedure followed by the personnel in charge of transporting the waste, the equipment used and importantly, the protective gear provided by the hospital and the usage of this protective gear by the personnel. Pre-treatment of waste has been assessed on the basis of the process used by the hospital to disinfect or decontaminate waste before final disposal to either the municipal waste collectors or dumping grounds.

While theoretical recognition of the importance of proper waste management practices as well as identification of appropriate procedure are important, constant monitoring of the system especially in the nascent stages of its implementation in the hospital is vital to its success. Inadequate monitoring could not only lead to improper implementation of the system but also to wrong practices being inadvertently adopted by personnel. We have found in our study that one of the areas where such mistakes can occur is the segregation of waste at source. Adequate norms have to be laid down by administrators in implementing the system, as well as periodic reviews of the system as a whole. These aspects have also been given importance in this survey.

The initial steps in any system add up to a measurable extent only if the subsequent measures are also strictly implemented. A centralised facility has been proposed in order to make waste disposal effective and accessible. If established and run properly, such a facility could ensure that all waste is disposed off in a safe manner and in compliance with the norms laid down by the law.

In this study, special attention has been given to the method of disposal of blood bags, urine bags and laboratory samples.

Survey Findings:

Apollo Hospital:
This is a Multi–speciality, 500 bedded hospital.

Waste Management within the Hospital:
a. Nursing Station:
Segregation of waste is being carried out in the wards on the basis of a colour-coded system. Needles are being destroyed and syringes cut in a needle destroyer which is present in each ward. The staff of the hospital are aware of the waste management practices followed in the hospital.

Blood bank: Destroyers are used in the blood bank for needles and blood bags to be discarded are injected with Hypochlorite solution, autoclaved, shredded and discarded through a contractor along with the rest of the plastic waste.

b. Transportation within the hospital:
The waste is transported from the wards to the common area in colour coded trolleys. Housekeeping personnel use gloves while transporting the waste.

c. Main Bin:
Waste for the wards are collected and transported to the common collection area located behind the hospital. The disinfected and shredded plastic waste is disposed off with the Corporation or contractors. Uninfected plastic waste is soaked in Aseptic and then washed.

d. Treatment Facility:
1. Incinerator:
The double chambered incinerator is located on the 5th Floor terrace and waste from the Red bags is incinerated. These Red bags contain infectious waste like dressing, cotton and pathological waste. The waste is brought from the main collection area for incineration. The incinerator has a 40–kg capacity and is run for about 3 – 4 hours a day. The maximum temperature attained in the secondary chamber is about 1000°C. The ash from the incinerator is collected using a rake and disposed off with the Corporation. The incinerator operator has been provided with protective gear.

2. Autoclave:
The hospital has a dedicated waste autoclave, which is used to autoclave plastic waste brought from the wards in colour coded plastic bags. The plastics are then shredded and disposed off through a contractor.

Major Drawbacks:
1. Lack of adequate training to the housekeeping staff in safe disposal methods and final treatment of waste.
2. Improper disposal of liquid waste.

Positive Points:
1. The hospital has initiated a system of waste management.
2. Sharps management.
3. Autoclaving and shredding of plastics.

Apollo Speciality Hospital:
This is a 250 bedded, private Super–speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a system of waste segregation using colour-coded bins. The hospital generates infectious waste, non-infectious waste and plastic waste. Needle cutters have been provided at the Nursing Stations. The tip of the syringe is cut and the needle is burnt.

Laboratory waste is disinfected with Hypochlorite and Microclen before disposal. Liquid waste is discharged into the drains directly.

Management of waste is being out-sourced to a private contractor.

Blood bank: The plastic waste from the Blood Bank is treated with Hypochlorite before disposal and the standard procedure for containing spills is to disinfect the area with Hypochlorite. Cotton waste and dressing from the Blood Bank is treated as infectious waste and incinerated.

b. Transportation within the hospital:
The waste from the Nursing Stations are collected in a large trolley and disposed to the ground floor through the channels that run through the length of the building. The infectious waste that is to be incinerated is taken to the 6th floor terrace for incineration. Plastics that are to be disposed are given to a contractor and the general waste is disposed with the municipal waste collectors.

c. Main Bin:
The common collection area is located to the rear of the building. Plastic waste like IV bottles are handed over to a contractor directly.

d. Treatment Facility:
1. Incinerator:
The incinerator is located on the 6th floor of the hospital. It is a double chambered incinerator housed in a small shed. The infectious waste that is to be incinerated is loaded in the incinerator by the staff employed by the contractor and the incinerator is switched on by the engineer. Depending on the quantity of waste and the kind of waste being incinerated, the temperature and the duration for which the incinerator is operated is varied.

It was observed that the incinerated ash contained burnt up needles also. This ash is disposed off along with the Municipal waste.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. The hospital does not have a shredder for plastic waste on campus. Waste is being transported to Apollo Hospital for shredding.
2. The waste is handed over to the contractor without mutilation.
3. Training is not being given to the staff on safe Bio Medical Waste Management methods.

Positive Points:
1. A system of waste management has been initiated by the hospital.
2. The staff of the hospital were very helpful in providing information for the survey.

Best Hospital:
This is a 100 bedded, Multi–speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
The Nursing Stations do follows a very basic system of segregation. All the waste is segregated in terms of sharps, general waste and plastic waste. In the rooms, waste is collected in a single bin. The hospital does not use needle cutters to destroy sharps – they are incinerated. Cotton and gauze are collected separately.

Laboratory waste and Operation Theatre waste are collected separately and incinerated

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
The bins are carried manually from the wards to the common collection without any protective gear.

c. Main Bin:
The main bin is situated on campus near the front compound wall. The waste is brought here by the housekeeping staff and dumped in the main bin. It is collected by the Municipality every day.

d. Treatment Facility:
1. Incinerator:
The incinerator is single chambered incinerator, which is located behind the hospital building. The temperature of the incinerator is 1000^{o}C. Infectious waste like cotton and gauze is incinerated.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No proper system of Bio Medical Waste Management is followed.
2. No training of staff.
3. Incinerator is single chambered.

Positive Points:
1. The hospital has initiated a system of segregation of waste.

Billroth Hospital:
This is a 100 bedded, Multi–speciality private hospital.

Waste Management within the Hospital:
a. Nursing Station:
The waste generated in the wards is all disposed off together in a single bin containing general waste, infectious waste and plastic waste. IV bottles are collected separately by the nurses. Needle cutters have been provided at all nursing stations to dispose off of needles. Staff are not aware of the hazards of Bio Medical Waste. Nurses report having sustained needle stick injuries.

Waste from the OT is also disposed with the Municipal waste. Placenta is collected in maternity bags after each delivery and is disposed off along with the Municipal waste. The Labour ward is disinfected with Formalin. Rubber sheets used in this ward are cleaned with Ariel and Dettol.

Laboratory waste is cleaned and sterilised using chemicals.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Housekeeping staff collect the waste twice a day. The bins are emptied into large plastic covers by the housekeeping staff and carried to the ground floor. Latex gloves are used by the wardboys while handling waste.

c. Main Bin:
The main bin is located to one side of the hospital where the waste collected in the large blue bags are kept for the Municipal waste collectors to collect.

d. Treatment Facility:
1. Incinerator:
The incinerator is located in the terrace of the hospital but is not functional.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No segregation of waste.
2. Disposal of waste without any disinfecting.
3. No training of staff.
4. No protective gear.

Positive Points:
1. Management very receptive to new ideas and methods of Bio Medical Waste Management.

CSI Rainy Hospital:
This is a 450 bedded, Multi–speciality private hospital.

Waste Management within the Hospital:

a. Nursing Station:
Segregation of waste is not being carried out. All the waste is collected in a single bin except plastic waste and sharps. Plastic waste is collected separately while sharps and OT waste is also disposed off with the Municipal waste.

A separate bag is used to collect waste of HIV positive patients.

Laboratory waste is soaked in dilute Hypochlorite for an hour before disposal and plastic waste like petridishes and culture plates are autoclaved and disposed. Some of the reusable plastic instruments are disinfected with dilute Lizol and then cleaned.

Blood bank: The hospital has a Blood Bank. All waste from the Blood Bank is disinfected with Hypochlorite solution before disposal. The disposable instruments used are disinfected and dumped along with the Municipal waste or burnt behind the hospital building.

b. Transportation within the hospital:
The hospital staff manually transport the waste from the wards to the common collection area located behind the hospital building. The waste handlers do not use any protective gear.

c. Main Bin:
The hospital does not have a main bin as such but a pit behind the hospital is being used to collect all the waste. The municipal waste collectors collect this waste on a daily basis. Open burning of garden waste and some plastic waste in this pit was also noticed.

d. Treatment Facility:

1. Incinerator:
The incinerator is located in the terrace of the 3rd floor and is a single chambered incinerator. Some infectious waste like cotton and dressing is incinerated. Waste from HIV positive patients is also incinerated.

2. Autoclave:
The hospital does not have a dedicated autoclave for waste.

Major Drawbacks:
1. No segregation of waste.
2. No training of staff on bio-medical waste practices.
3. Open dumping of waste.
4. Incinerator is a single chambered incinerator.
5. Burning of plastic that have been contaminated with blood or body fluids in HIV positive cases.

Positive Points:
1. The hospital is planning on installing a system of Bio Medical Waste Management.

Chennai Kaliappa Hospital:
This is a 65 bedded, Multi–speciality hospital.

Waste Management within the hospital:

a. Nursing station:
The hospital does not follow any system of waste segregation. The Administrative officer says that the hospital is waiting for the Centralised facility to be put up to deal with their waste.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
The waste is said to be collected twice a day from the wards manually. No protective gear is used by the staff while handling the waste. It is then transported outside the hospital to a Municipal bin.

c. Main bin:
The hospital does not have a main bin as such but all the waste is disposed off in a bin located outside the hospital. The Municipality collects the waste from here.

c. Treatment facility:
1. Incinerator:
The hospital has a manually operated incinerator that is mainly used for incinerating dressings and other infectious wastes from the wards.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major drawbacks:
1. Even basic segregation of waste is not done by the hospital.
2. There was a lot of reluctance on the part of the administrative officer to allow us to look around as a result none of the details given to us could be verified.

Communicable Diseases Hospital:
This is a 350 bedded hospital that that treats diseases like Chicken pox, Measles, Mumps Cholera and Diahorrea.

Waste Management within the Hospital:
a. Nursing Station:
Segregation of waste is being carried out in the wards on the basis infectious waste and non-infectious waste. Non-infectious plastic waste like IV bottles are collected separately and sold. Some of the laboratory waste is disinfected with Phenyl solution and discarded.

No needle cutters have been provided either in the labs or the wards. All syringes are treated as infectious waste and are stored with bleach in a separate room in the campus. Waste from the labs are treated with phenyl and buried on campus.

As most of the liquid waste generated in the hospital is infectious in nature and are therefore treated with disinfectants like bleach powder and then discharged into the drains.

Blood bank: The Hospital does not have a Blood Bank.

b. Transportation within the hospital:
Transportation of waste within the hospital is done using trolleys with bins lined with plastic bags but these bins are not colour-coded. The infectious waste and non-infectious waste are collected separately and the latter is then disposed through the Municipal waste collectors. This infectious waste is being stored in a separate room as the hospital does not have an incinerator and since it cannot be disposed off with the Municipal waste. No protective gear is used by the staff while transporting the waste.

c. Main Bin:
The hospital does not have a main bin as such. Waste classified as infectious waste is stored in big bags lined with bleach powder and stored in the campus. Non-infectious waste is collected by the Municipal waste collectors regularly.

d. Treatment Facility – None.

Major Drawbacks:
1. Disinfected infectious waste like sputum and is dumped into pits and buried around the hospital campus.
2. Storage of other infectious waste on campus.
3. More emphasis has to be given to the formal training of the staff in the disposal of waste and the final treatment of waste as the waste generated by the hospital is highly infectious in nature.

Positive Points:
1. The hospital has initiated a system of segregation of waste on the basis of infectious and non-infectious waste.
2. The hospital staff have informal training sessions for their staff and wardboys on waste management. These sessions are conducted by the medical officers who undergo training once a year.
3. All workers and hospital staff have are given Hepatitis B Vaccination yearly.

Devaki Hospital:
The hospital is a Multi–speciality private hospital.

Waste Management within the Hospital:
a. Nursing Station:
No system of segregation of waste is being carried out in the hospital. All the waste is incinerated except body parts, which are sent to the Crematorium. Needles are incinerated. All the waste is collected in plastic bags.

Blood bank: No segregation of waste. All the waste is disposed off together and the plastic waste is given to the contractor.

b. Transportation within the hospital:
Waste is collected form the wards two to three times a day in trolleys. Protective gear is not being used while transporting the waste from wards to the final disposal area. Staff report having sustained needle stick injuries but have not reported the same to the hospital authorities.

c. Main Bin:
The main bin is situated behind the hospital near the incinerator. All the waste is collected together and the ash collected from the incinerator is disposed off with the Municipal waste collectors.

d. Treatment Facility:
1. Incinerator:
The hospital has a single chambered incinerator located in behind the hospital building. The maximum temperature reached by the incinerator is 800°C. All the waste is incinerated without segregation. The waste is collected in sealed polythene bags and fed directly into the incinerator.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No segregation of waste.
2. Attenders and staff do not use protective gear.
3. Incinerator is only a single-chambered incinerator.
4. No training is given to the staff on waste management.

Dr. H.T Vira Reddi Hospital:
This is a 30 bedded, Multi–speciality hospital.

Waste management within the hospital:

a. Nursing station:
The hospital has initiated a system of colour coded segregation of waste. Segregation of waste however is not followed completely - there is only partial segregation of waste. Sharps are destroyed using a needle destroyer. Plastic wastes like IV tubes are given either to a contractor or to the municipality.

Liquid waste is disinfected with and disposed off through the common drainage system.

Blood Bank: The hospital does not have a blood bank.

b. Transportation within the hospital:
The waste is disposed in dustbins in the wards. It is then taken to the final disposal site in plastic covers and disposed there. The occurrence of needle prick injuries is very rare and often not reported.

c. Main bin:
All the waste is collected from the wards and dumped at the main bin without segregation. Infectious waste either goes to the incinerator or is sent through the Municipality.

d. Treatment facility:

1. Incinerator:
The hospital has a double chambered gas incinerator. Waste weighing less than 900 grams it is incinerated in the hospital but if the quantity of waste is more than 1000 grams, then the waste is given to the Corporation. Infectious waste like dressings, placenta, and operating theatre waste are incinerated. The Incinerator reaches a temperature of about 1200^{o}C. The Incinerated Ash is disposed along with the Municipal Waste. The operators of the Incinerator have been provided gloves.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major drawbacks:
1. Despite the hospital adopting a colour-coded system for waste segregation, waste is not segregated.
2. IV tubes and plastic wastes are disposed off directly to the Municipality without any form of disinfection.
3. No training of staff.

Positive points:
1. The hospital has initiated a system of waste management but training and monitoring of staff is necessary.
2. Sharps management initiated.
3. The staff were very helpful in providing information about the practices followed.

Dr. Hande Hospital:
This is a 50 bedded, private Multi–speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
The waste is collected in a single bin and is later segregated by the hospital workers. Needles are recapped and disposed. Though the hospital follows a system of colour–coded waste segregation system, the nurses said that bins have not been provided to them for this purpose. The Administrator of the hospital seems unsure of the system in place.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported within the hospital by the hospital workers to the main bin. The Municipal workers collect the waste on a weekly basis.

c. Main Bin:
The main bin is located behind the hospital building. The waste is segregated at this point but the hospital workers before disposal. All the waste including placenta is handed over to the Municipality as the incinerator is now not operational.

d. Treatment Facility:
1. Incinerator:
The incinerator is situated behind the hospital building and is housed in a small shed adjoining the room occupied by the hospital workers. The incinerator is indigenously made and is single chambered. The exhaust from the incinerator leads the side of the shed and is very low. The incinerator is presently not in operation.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No segregation of waste.
2. No training of staff.
3. Staff and administration exhibit a very low level of awareness on the hazards of unsafe practices.
4. No protective gear is used.

Dr. Mehta Nursing Home:
This is a 60 bedded, Multi–speciality private nursing home.

Waste Management within the Hospital:
a. Nursing Station:
Waste is segregated on a colour-coded basis. The bins have also been labelled in order to indicate the kind of waste that is to be disposed in each bin. Needle cutters have not been provided and therefore, the nurses bend the needles against the table before disposal. A separate puncture proof container has been provided for the disposal of these needles. Waste is collected twice a day. Nursing Staff are aware of the medical waste practices being followed in the hospital.

Operation Theatre waste is collected in kidney trays and disposed finally along with other infectious waste. Placenta is sent for Burial to the crematorium.

Linen is disinfected with dilute Hypochlorite Solution for about 20 minutes and rinsed under running water by the hospital workers before giving them to the dhobi for laundering.

Laboratory instruments like tips and petridishes are being autoclaved before disposal.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported from the wards to the common collection area twice a day in trolleys with colour–coded bins. The administration say that though the wardboys have been provided with protective gear – gloves and masks, but do not always use the gear provided. Training has been provided to the staff but not to the doctors. Amputated limbs and body parts are sent to the Crematorium.

c. Main Bin:
The common collection area located behind the hospital is kept locked. A shredder and a dedicated waste autoclave have been planned for and are to be installed shortly. The bags that are to be disposed with the Municipal waste collectors are stored here and then finally given to them. The administrators of the Nursing Home report having seen the Municipal waste collectors empty the waste out of the bag and keeping the bags - in all probability for the purpose of resale.

d. Treatment Facility:
1. Incinerator:
The hospital does not have an incinerator.

2. Autoclave:
The hospital does not have a dedicated waste autoclave but provisions are being made to acquire an autoclave as well as a shredder for plastic waste.

Major Drawbacks:
1. More thorough monitoring of the system of Bio Medical Waste Management being implemented.
2. Lack of a formal training programme on Bio Medical Waste.

Positive Points:
1. Initiated a system of segregation in the hospital.
2. Administrators and staff are very open to newer and better methods of Bio Medical Waste Management.

Durgabhai Deshmukh General Hospital and Research Centre:
This is a Multi–speciality, Charitable hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital generates all kinds of waste. Only partial segregation of waste was observed using colour-coded bins. A final segregation of waste is done near the washing area by the hospital workers. Hospital workers separate needles disposed in the wards manually from the syringes making them highly susceptible to needle stick injuries. Needles and syringes are disinfected with Sodium Hypochlorite solution and then sold to a local contractor. Medicines that are to be discarded are put in water and are sent for Deep Burial (6 – 8 feet). The general waste is collected by the ONYX collectors - who have substituted Municipal waste collectors in certain areas of Chennai City.

Operation Theatre waste is incinerated. Liquid waste is disposed off into the drainage after treatment with Lizol and Savlon. Stained linen is cleaned by the hospital staff first and then sent to a dhobi. Soaking of stained linen in Bleach is also done by the hospital staff without the use of protective gear.

Plastic bottles are sold to a contractor. The contractor collects plastic waste once every 3 months or as the need arises. A pile of needles and syringes were found collected under the stairway to the office. These were to be disposed by sale to the local contractor.

Blood bank: The hospital does not have a Blood bank but Blood and blood bags are autoclave and incinerated.

b. Transportation within the hospital:
The hospital workers collect waste twice a day. Gloves are to be used by the hospital staff while collecting waste.

c. Main Bin:
The waste is taken to a washing room where it is put through a final segregation process of separating the soiled cotton and dressing as well as the needles from the syringes.

d. Treatment Facility:
1. Incinerator:
The incinerator is an indigenously built single chambered incinerator located behind the maternity ward. As the hospital received complaints of a bad odour being emitted from the incinerator, they increased the length of the chimney, which is now about 15 – 20 feet long. As the incinerator is indigenously made, it does not have temperature controls but is normally run for about 1-4 hours depending on the quantity of waste being burnt.

Apart from infectious waste, Placenta is also incinerated. The ash from the incinerator is sent for Deep Burial. All Deep Burial is done within the hospital premises. Body parts are collected separately and sent to the Crematorium with bodies as well as a note from the Government General Hospital for burial. Syringes are burnt in a pit near the incinerator along with plastic tubes and IV bags. The remaining ash from this pit is buried. Gloves are also incinerated. The pit used to burn plastic waste contained waste yet to be burnt.

2. Autoclave:
The hospital does not autoclave waste.

Major Drawbacks:

1. Improper segregation of waste.
2. No sharps management.
3. No training.
4. No protective gear while handling waste.
5. Open burning of plastic waste like tubing of IV sets.

Positive Points:

1. Matron was very helpful in providing information on the waste management system being followed.

Ehrlich Laboratory:
This is a private laboratory and research centre.

Waste Management within the Blood Bank:
a. Collection cubicles:
The waste generated and segregated by Laboratory includes blood-contaminated cotton waste, sharps and plastic waste. In the collection cubicle, cotton contaminated with blood, needles, syringes and packaging waste are generated. This waste is segregated into 4 colour-coded bins. Needle destroyers are used to burn the needle and cut the tip of the syringe. The syringe is then put in Hypochlorite solution, which is kept in the plastic bag lining the puncture proof containers. It was noticed that one of the collection cubicles had a fine spray of blood over the table, the table leg, the curtain and the wall. A blood drop was also noticed on the notebook used to record details of patients and tests.

Waste is segregated in the laboratories as well following the same system as the collection cubicle. Samples that are to be disposed are autoclaved before disposal. The plastic disposable containers used to perform tests are also autoclaved and discarded. The instruments that are to be reused are disinfected in Sodium Hypochlorite solution and then autoclaved and sterilised before reuse. Urine strips used in tests are discarded along with the infectious waste. The straws used to smear samples are also discarded as infectious waste. Plastic test tubes that are used in haematological tests are discarded after each test. Slides are disinfected with Sodium Hypochlorite Solution and then discarded along with the Municipal waste. Dettol is used to clean workstations

The staff have reported needle stick injuries.

Spill Control Protocol: The procedure followed for treatment of spills is to disinfect the area with spirit and cotton.

b. Transportation of waste:
Waste is transported within the Laboratory by an attender who wears protective gear while handling the waste. The plastic bags lining the bins are removed from the bins and laboratory waste like tissue samples and cultures are already autoclaved. The bags containing the needles are taken to the wash area behind the Laboratory building and are first drained of the Sodium Hypochlorite Solution by piercing a small hole in the bag and draining the liquid into a sink. The samples from the laboratories, like the test tubes containing blood, are first drained of the blood and then soaked in Sodium Hypochlorite Solution.

c. Treatment Facility:
1. Autoclave:
Infected blood units are stored and autoclaved once a week and then disposed.

Major Drawbacks:
More training is to be given to attenders and the staff to emphasise the seriousness of the issue of Bio Medical Waste management.

Positive Points:
1. Doctor in charge of the Blood Bank is very knowledgeable on the issue of Bio Medical Waste and has successfully initiated a system of segregating and handling the waste generated.
2. No incineration of waste is done.
3. All waste is autoclaved before disposal.

G. G. Hospital:
This is a 65 bedded, Obstetrics and Gynaecology Hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a basic system of segregation. Waste is segregated into sharps, plastic waste and general waste. The wards do not have needle cutters and the needles are all cut manually. Infectious Operation Theatre waste is taken directly to the incinerator.

Liquid waste is discharged into the drains after treatment with a chemical disinfectant.

The Administrator who has been trained by the Pollution Control Board gives the Housekeeping staff and the wardboys training on waste management.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported from the wards to the final disposal area by the housekeeping staff to either the final disposal site or the incinerator directly.

c. Main Bin:
There is no main bin as such. The waste collected in taken to the incinerator or disposed off with the Municipality directly.

d. Treatment Facility:
1. Incinerator:
The incinerator is single chambered and is located on the top floor of the hospital. Operation Theatre waste like cotton, dressing, placenta and dead foetus is incinerated. Inspection of the incinerator revealed some unburnt waste. The ash from the incinerator is disposed off with the Municipal waste.

2. Autoclave:
The hospital does not have an autoclave for waste.

Major Drawbacks:
1. The incinerator is only single chambered.
2. Lack of adequate training and monitoring of the system in place.
3. Needles are cut manually without the use of protective gear.

Positive Points:
1. The hospital has initiated a system of waste segregation.

General Surgical Clinic:
This is a Multi–speciality private surgical clinic with limited patients.

Waste Management within the Hospital:
a. Nursing Station:
The waste being generated here consists of cotton, gauze and general waste as only minor surgeries are performed here. Waste is not segregated.

Liquid waste is disinfected before it is discharged into the drains.

Blood bank: The Clinic does not have a Blood Bank.

b. Transportation within the hospital:
The hospital is very small and therefore the bin is carried directly from the ward to the waste collector by the hospital staff.

c. Main Bin:
The waste collected is disposed off directly with Exnora.

d. Treatment Facility
1. Incinerator:
The hospital does not have an incinerator.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No system of Bio Medical Waste Management is followed.
2. No training of staff.
3. No treatment of waste before disposal.

Positive Points:
1. The hospital is interested in initiating a system of Bio Medical Waste Management.

Government General Hospital:
This is a Multi–speciality Government hospital.

Waste Management within the Hospital:

a. Nursing Station:
No segregation of waste is followed in the hospital. All the waste is disposed in one single bin including infectious waste and sharps. Most of the syringes and needles used are of the disposable kind and therefore the nurses recap the needles before disposing them. This however increases their chances of needle stick injuries. Bleach is used to line the corridors once a week. Staff are completely unaware of the hazards of Bio Medical Waste and the Rules.

Blood bank: The blood bank does not follow a system of waste segregation either.

b. Transportation within the hospital:
The waste is transported from the wards to the common Collection Centre by trolleys or in large bins mounted on bicycles. The employees have not been provided with any protective gear and have sustained needle stick injuries.

c. Main Bin:
The main bin is located at one end of the campus adjacent to the overbridge near the hospital. The waste is dumped into a Municipal waste bin, which is emptied by the Municipal waste collectors once a day. The waste in this bin is not segregated either. A collection of waste like syringes and plastic packaging material was also noticed at an opposite corner (also under the bridge). The waste dumped in the hospital is easily accessible to scavengers.

d. Treatment Facility:

1. Incinerator:
The incinerator is used to burn part of the waste generated by the hospital like the blood bags and urine bags. Waste like placenta are collected in a tray in the labour ward and disposed off once a week.

2. Autoclave:
No autoclave dedicated for the waste.

Major Drawbacks:
1. Improper segregation of waste.
2. No training of staff.
3. Open dumping of waste.
4. No treatment for liquid waste.

Government Peripheral Hospital:
This is a 100 bedded, Multi–speciality government hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital does not segregate the waste. All the waste is collected in a single bin without a plastic lining. Needles to be reused are autoclaved while those that are to be disposed are manually broken and the tips are buried on campus. Small body parts are incinerated while larger parts are sent to the Mortuary. Placenta is buried.

Liquid waste is disinfected with any general bathroom disinfectant and drained into a pit on campus.

Pigs were noticed near the Women's ward at the time of the visit. Staff are unaware of Bio Medical Waste Management and the hazards associated with improper practices.

Blood bank: The hospital has a Blood Bank.

b. Transportation within the hospital:
Waste is transported from the wards to the final collection centre in bins without lining. The bins are the cleaned by hospital staff without using any protective gear and are replaced in the wards.

c. Main Bin:
The waste collected is disposed off with the Municipal waste collectors once a day.

Major Drawbacks:
1. No segregation of waste.
2. No training of staff.
3. Hazardous sharps management (manual mutilation of needles).
4. Inadequate hospital hygiene.

Positive Points:
1. Disinfection of liquid waste before disposal.

Halstead Surgical Clinic:
This is a surgical clinic.

Waste Management within the Hospital:
a. Nursing Station:
The hospital does not follow a particular waste management system. All the waste is disposed along with infectious waste is given to the Municipality. Hazardous waste is disinfected with Formalin tablets. The waste is collected from the wards once a day. The needles are destroyed using a shredder. There are also needle cutters present in each floor of the hospital.

The liquid waste is said to be treated with sodium Hypochlorite solution.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
The waste is currently transported manually from the wards to the Common disposal area. Protective gear has not been provided to the employees.

c. Treatment Facility:
1. Incinerator:
The hospital has a single chambered incinerator that is fuelled by gas present on campus but it incinerator and does not comply with the standards. Waste is also collected from KKR ENT Hospital for incineration.

2. Autoclave:
The hospital does not have a dedicated waste autoclave. The plastic waste is collected separately and given to a contractor.

Major Drawbacks:
1. Since we couldn't tour the hospital we could not come to any concrete conclusions about the waste management in the hospital.

Institute of Thoracic Medicine:
This is a Government Super–speciality, Out Patient hospital dealing with diseases of the chest and lungs only.

Waste Management within the Hospital:
a. Nursing Station:
The Nursing stations have been provided with bins for cotton waste and other packaging waste. Separate buckets filled with Lizol have been placed all around the campus for patients to spit their sputum into. Disposal syringes as well as glass syringes are being used. The disposable syringes are discarded after use while the glass syringes are reused after sterilisation. Sharps are collected along with the infectious waste like cotton and dressing.

Endoscopy instruments and bronchoscopes are disinfected with a 2% Cidex solution before reuse. Laboratory waste like sputum containers (disposable) and sputum samples are disposed after disinfecting them. The disposed slides are sent for land fills on campus.

Blood Bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported within the hospital by the hospital workers using trolleys. The staff handling waste have not been provided with protective gear. The staff use brooms to handle the waste.

c. Main Bin:
There is no main bin as such for the waste. The waste is dumped in a pit near the front compound wall of the hospital and the sub workers burn most of it in open air.

d. Treatment Facility:
1. Incinerator:
The hospital does not have an incinerator and some waste like cotton is burnt in open air by the hospital workers. Sharps are also burnt along with this waste.

1. Autoclave:
The hospital does not have a dedicated autoclave for waste.

Major Drawbacks:
1. Partial segregation of waste.
2. No training of staff.
3. Open burning of waste - closer inspection of the waste revealed sharps and unburnt waste.
4. No protective gear is utilised by either the lab technicians or the waste handlers.

Positive Points:
1. Provision of Lizol – filled buckets (dilute) for patients to spit sputum into.
2. Premises kept very clean.
3. Administrative Officer as well as the Director of the hospital were very helpful in providing information about the hospital.

Indian Red Cross Society Blood Bank:
This is a private blood bank and research centre.

Waste Management within the Hospital:
a. Collection Room:
The waste generated by the Blood Bank includes blood-contaminated cotton waste, sharps, infected blood units, expired blood units, samples and plastic waste. In the collection room, only cotton and sharps are generated. The blood bags are sealed with electronic sealers once the blood has been collected and the end of the tube containing the needle is cut and disposed. The waste is segregated on the basis of general waste and waste contaminated with blood and blood waste.

In the laboratories, samples that are to be disposed are disinfected with a 1% Hypochlorite Solution before disposal.

The staff has reported needle stick injuries.

Spill Control Protocol: The procedure followed for treatment of spills is to first contain the spill with a strong Hypochlorite solution.

b. Transportation of waste:
Waste is transported within the Blood Bank by attenders who wear protective gear while handling the waste. The waste is collected and dumped in a pit on campus and the waste is then burnt.

c. Main bin:
The hospital does not have a main bin. All the waste is handed over to the Municipality directly and some of the waste is burnt on campus.

d. Treatment Facility:
1. Autoclave:
Infected blood units are stored separately and are sent to MGR University in Cool bags for research being conducted by the University.

The hospital does not have an incinerator and therefore plastic waste like pipettes is burnt in open air along with cotton and dressing and other waste.

Major Drawbacks:
1. Inadequate segregation of waste.
2. Open burning of waste including plastic waste.
3. Training is to be given to attenders and the staff to emphasise the seriousness of the issue of Bio Medical Waste management.

Positive Points:
1. The hospital is looking for alternatives to open air burning of plastic and other waste.

Institute of Child Health and Hospital for Children:
This is a 530 bedded, government paediatric hospital.

Waste Management within the Hospital:

a. Nursing Station:
The waste generated is disposed without segregation. The Nursing Stations have one bin into which all the waste is disposed. Needle cutters have not been provided in the wards but the needles are however, bent by the nurses before disposal. This increases the chances of needle stick injuries among nurses. Savlon is used to disinfect the glass syringes, which are also sterilised before reuse.

The laboratory waste is also disposed off in a similar manner and the lab instruments are sterilised before reuse.

Liquid waste is discharged intro the drains without any treatment.

Blood bank: The Blood Bank also disposes the waste without segregation. Blood bags are disposed off with the Municipal waste without disinfecting them.

b. Transportation within the hospital:
The waste is collected by the hospital staff and transported from the wards to the ground floor through a channel that runs through the length of the building. This channel is to be cleaned once a week with Lizol but on the day the hospital was visited, the waste had not been cleaned and appeared to have been collecting at the bottom of the duct for some period of time.

c. Main Bin:
The main bin is located in the rear part of the hospital where the waste is collected and then handed over to the Municipality. The hospital has a series of open drains, which at the time of the visit were clogged with food and plastic waste.

Major Drawbacks:
1. No segregation of waste.
2. No training of staff.
3. No sharps management.
4. No treatment to liquid waste before disposal.
5. No protective gear provided for waste handlers.

Positive Points:
1. Hospital was planning on installing a new system of Bio Medical Waste Management within a short period.

Jeevan Blood Bank and Research Centre:
This is a private blood bank and research centre.

Waste Management within the Blood Bank:
a. Collection Room:
The waste generated and segregated by the Blood Bank includes blood-contaminated cotton waste, sharps and plastic waste. In the collection room, all of the above are generated. The blood bags are sealed with metal clips once the blood has been collected and the end of the tube containing the needle is cut and put in a bleach solution in a puncture proof containers.

In the laboratories, samples that are to be disposed are put in a Hypochlorite solution for about half an hour before disposal with the Municipal waste collector.

The staff has reported needle stick injuries.

Spill Control Protocol: The procedure followed for treatment of spills is to first contain the spill with a strong Hypochlorite solution and then again disinfect the area with Lizol.

b. Transportation of waste:
Waste is transported within the Blood Bank by attenders who wear protective gear while handling the waste. The plastic bags lining the bins are removed from the bins and this waste is autoclaved before disposal through the Municipal Waste collectors.

c. Treatment Facility:
Autoclave:
Infected blood units are stored and autoclaved once a week and then disposed.

Major Drawbacks:
More training is to be given to attenders and the staff to emphasise the seriousness of the issue of Bio Medical Waste management.

Positive Points:
1. Doctor in charge of the Blood Bank is very knowledgeable on the issue of Bio Medical Waste and has successfully initiated a system of segregating and handling the waste generated.
2. No incineration of waste is done.
3. All waste is autoclaved before disposal.
4. Spill Control Protocol is in place.

K. J. Hospital:
This is a 100 bedded, Multi–speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a system of segregation of waste based on a colour-coded bin system. The hospital has provides 4 different bins for infectious waste, solid waste, sharps and general waste. Needles are disposed off in a puncture proof container.

Liquid waste is treated with Hypochlorite Solution before disposal through the Drainage system. Placenta as well as samples form the laboratories are disposed off along with the liquid waste.

In this hospital, almost all the surgeries are performed using laser equipment and as a result of this they generate a small amount of Operation Theatre waste. Segregation of waste is done and sharps are segregated here as well.

Blood Bank: The hospital has a Blood Bank. Cotton waste and dressing is disposed off along with the Corporation waste. Blood bags that are to be discarded are collected separately and incinerated.

b. Transportation within the hospital:
The waste is collected from the wards twice a day by the housekeeping staff manually. Protective gear has not been provided by the hospital to these waste handlers, thus making them susceptible to infection and disease.

c. Main Bin:
The main bin is not segregated. All the waste is collected together and disposed off through the Municipality. Plastic waste like syringes and IV bags are sold to a private contractor.

d. Treatment Facility:
1. Incinerator:
The incinerator is not used very frequently - only about once in a month. It operates on gas and is single - chambered. Blood bags are incinerated. Incinerator Ash is disposed off through the Municipality. The staff of the hospital were not sure as to what was done with pathological waste like body parts and dead foetus.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. Though the hospital seems to have initiated a system of waste management, it is not implemented effectively.
2. No training of staff.
3. No protective gear.

Positive Points:
1. Disinfection of liquid waste before disposal through the Drainage system.
2. Hospital staff was very forthcoming about the practices followed in the hospital.

K.K.R ENT Hospital and Research Institute:
It is a head and neck surgery speciality hospital with 30 beds.

Waste Management within the Hospital:
a. Nursing Station:
It is a hospital where almost all the surgeries are performed using laser equipment. As a result of this they do not generate as much waste as the other hospitals do. Segregation of waste is carried out to a certain extent.

Liquid waste is disinfected with a chemical disinfectant before disposal through the Drainage system.

Blood Bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
We were not allowed to look around the hospital and were therefore not ascertain this information.

c. Main Bin:
The Administrative Officer said that, at present waste is collected from the wards and deposited at the Municipal dustbin near the premises of the hospital.

d. Treatment Facility:
1. Incinerator:
They do not possess an incinerator. All their surgical waste is transported to Halstead Surgical Clinic for incineration. Other non-surgical waste is disposed through a Municipal waste collection bin located near the hospital premises.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. We were not allowed to go around the hospital.
2. They do not have an independent system of waste disposal.

Positive Points:
The Administrative Officer was very helpful in providing information about the hospital.

Kanchi Kamakoti Child Trust Hospital:
This is a 200 bedded, Paediatrics Super–speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
Segregation of waste is being carried out in the wards on the basis of a colour-coded system. Three bins have been provided and separate bins have been provided for needles (puncture proof containers) and non-infectious plastic waste. Laboratory plastic waste is disinfected with Hypochlorite solution and discarded.

Liquid waste is disposed off by disinfecting it with Sodium Hypochlorite and the through the common drains. The OT also follows the same system but waste is collected in kidney trays and then disposed.

Blood bank: Segregation done similar to the main hospital. Blood bags are incinerated. In the case of spills, the area is disinfected with a 2 – 3 % Hypochlorite Solution.

b. Transportation within the hospital:
The waste is transported within the hospital using trolleys with colour-coded bins. Though training has been provided to the staff by Srishti, the level of awareness in the hospital is still not up-to-the-mark and requires more emphasis on a regular basis to ensure that the system initiated is successful.

c. Main Bin:
The main bin is situated close to the hospital's compound wall giving the Municipal waste collectors easy access to the waste. The waste, collected in plastic bags (3/4th full bags) is kept here for the waste collectors to remove. The waste is cleared once a day.

d. Treatment Facility:
1. Incinerator:
The hospital has a single chambered incinerator is situated on the 7th floor of the hospital and is used to incinerate autoclaved infectious waste. Protective gear has been provided by the hospital (gloves and masks) but is used infrequently by the operator of the incinerator.

2. Autoclave:
The hospital has a dedicated waste autoclave, which is used to autoclave plastic waste.

Major Drawbacks:
1. Despite training the system is not being followed completely. Regular training and monitoring is required.
2. Waste handlers are not monitored with regard to the Bio Medical Waste Management practices adopted in the hospital.

Positive Points:
1. A system of Bio Medical Waste Management has been initiated.
2. Hospital has a dedicated waste autoclave.

Kensington Hospital:
It is laproscopic and general surgery hospital with 20 beds.

Waste management within the hospital:

a. Nursing station:
The hospital does not segregate the waste generated. All the waste is disposed off in a single bin. Operation Theatre waste is also disposed off similarly. There are several waste management techniques being followed. The waste is collected in each ward. The general waste is sent to the corporation bin for disposal. They do not possess a needle-cutter. The doctors are instructed to use two pairs of gloves for surgery. All these gloves are burnt. The instruments used in the theatre are all thrown out. All disposable items are burnt.

Blood bank: The hospital does not have a Blood bank.

b. Transportation within the hospital:
All the bins in the hospital are lined with plastic bags. These bags are then lifted out of the bins and are transported to the disposal site. The general waste is also transported with the help of plastic bags and is given to the corporation for disposal.

c. Main bin:
There is no main bin. Waste is transported with the help of plastic bags and these are taken to the site of disposal.

d. Treatment facility:

1. Incinerator:
The hospital has a gas incinerator that is used to incinerate items like plastics, gauze, needles, and catheters. All disposable items and all the surgical items like gloves are all burnt.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major drawbacks:
1. We were not allowed to go around the hospital and therefore could not verify most of the details provided.
2. Although the chief doctor elaborated several waste management techniques, it didn't look very effective.

Positive points:
All the staff in the hospital is treated with several vaccination facilities in order to prevent needle stick injuries.

Kilpauk Medical College and Hospital:
This is a 512 bedded, Multi–speciality Government hospital..

Waste Management within the Hospital:
a. Nursing Station:
There is no segregation of waste. All the waste is collected in a single bin, which is then sent to the common collection area. The needles are also dumped along with the other waste.

Staff unaware of the Rules and the importance of waste management.

Blood bank: The hospital does have a Blood Bank. Blood bags and other plastic waste is sold a private contractor.

b. Transportation within the hospital:
Hospital staff transport the waste from the wards to the common collection area either in large plastic bags or the bins are directly emptied at the area. The hospital staff do not use any protective gear while handling the waste.

c. Main Bin:
The waste disposed off at the common collection area is collected by the Municipal waste collectors. This waste includes hazardous waste infectious waste, infectious waste, OT waste and sharps is disposed off with the Municipality.

Major Drawbacks:
1. No segregation of waste.
2. No training given to staff on the importance of proper waste management.
3. No treatment is given to liquid waste before disposal.
4. Staff not provided with protective gear.
5. No treatment to plastic waste before it is sold to the contractor.

Positive Points:
1. Administrative staff are open to the idea of installing a proper waste management system.

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Lions Blood Bank:
This is a private blood bank.

Waste Management within the Blood Bank:
a. Collection Room:
The Collection Room has provision for only 3 donors at a time and the waste collected in this area includes packaging waste, blood-contaminated cotton and sharps from the blood bags. The bags are sealed using electronic sealers and the needle end of the blood bag is cut and disposed off in a separate container. The needles are then transported to the terrace of the building where they are destroyed using a needle destroyer by one of the lab attendants. The bins have been lined with Blue plastic covers.

In the laboratories, samples are discarded in a Hypochlorite solution before disposal and the glass test tubes and so on are disinfected with Hypochlorite solution and then sterilised. The plastic pipettes used are made from autoclavable plastic and are therefore autoclaved and reused.

The staff have reported needle stick injuries.

Spill Control Protocol: The area containing the spill is disinfected with Hypochlorite solution and disinfected.

b. Transportation of waste:
As the Blood Bank is relatively small, the waste is transported form the Collection Room and the lab to their final disposal area manually. All autoclavable waste and waste and sharps are transported to the terrace while the infectious waste is treated with Bleach before disposal through the Municipal waste collectors.

c. Treatment Facility:
Autoclave:
The Blood bank does not possess an incinerator and were therefore sending all the waste that was to be incinerated to the TB Hospital in Tambaran for incineration. Recently however, this practice has been discontinued and therefore all infectious waste is disinfected and disposed with the general waste.

Major Drawbacks:
1. Inadequate sharps management.
2. Structured Spill Protocol should be adopted.

Positive Points:
1. Basic precautions with regard to managing medical waste have been taken.

Lister Laboratory:
This is a private laboratory and research centre.

Waste Management within the Blood Bank:
a. Collection Areas:
The waste generated and segregated by Laboratory includes cotton waste, sharps and plastic waste. This waste is segregated into infectious waste and non-infectious and general waste, which have both been allocated separate colour coded bins. Vaccutainers and syringes and needles used for collection of blood are collected separately and needles are cut and the syringe nose is cut and disinfected in a Hypochlorite solution before disposal.

The laboratory samples are collected in disposable plastic containers, which are autoclaved and disposed off with the Municipal waste. Hypochlorite solution is used for disinfecting all disposable instruments like pipettes, sample bottles, cotton and dressing and bandages before disposal. Urine strips used in tests are discarded along with the infectious waste. The straws used to smear samples are also discarded as infectious waste. The glass instruments used are disinfected in Hypochlorite solution immediately after use.

Spill Control Protocol: The procedure followed for treatment of spills is to disinfect the area with a strong Hypochlorite solution and cotton- both of which are disposed off along with the infectious waste.

d. Transportation of waste:
As the Laboratory is very small, the waste is collected and transported from the work areas by an attender using protective gear. All infectious waste is autoclaved before disposal.

e. Treatment Facility:
Incinerator and Autoclave:
The laboratory has both an incinerator as well as an autoclave. However, as the Laboratory has received complaints from the neighbours, the incinerator is not used. All infectious waste including plastic waste is autoclaved before disposal through the Municipality.

Major Drawbacks:
1. Cotton was found in the front waiting area just outside the reception area of the laboratory. Though the cotton was not seen to contain blood, precautions have to be taken to ensure that this waste is contained in a bin at all times before disposal.

Positive Points:
1. Doctor in charge of the Blood Bank is very knowledgeable on the issue of Bio Medical Waste and has successfully initiated a system of segregating and handling the waste generated.
2. No incineration of waste is done.
3. All waste is autoclaved before disposal.

MIOT Hospital:
This is a 117 bedded, Multi-speciality private hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital does not segregate waste at the source, but segregation of waste is carried out at the final disposal site according to the recyclable value of the waste. Needle cutters have not been provided by the hospital and presently nurses bend the needles before disposal. This increases their susceptibility to needle stick injuries.

Blood bank: The Laboratories are situated in the Blood Bank and are run by Eastern Medical Services situated near the hospital building.

b. Transportation within the hospital:
The waste is transported from the wards to the final disposal site using trolleys by the hospital staff who have been provided with latex gloves to use while handling the waste.

c. Main Bin:
The common collection area is situated behind the hospital building and all the waste is dumped here. The waste is segregated at the main bin by the contractor employed by the hospital. He is also in charge of disposing the waste. The hospital has not provided him with any protective gear or safe transportation methods for this purpose.

Plastic bags are transported by the contractor using a fish cart to an area beyond Ramachandra Medical College where it is burnt.

d. Treatment Facility:
2. Incinerator:
The hospital does not have an incinerator but pathological waste as well as cotton and dressing are burnt in open air in a pit with diesel.

3. Autoclave:
The hospital does not autoclave any of its waste.

Major Drawbacks:
1. No system of Bio Medical Waste Management is followed in the hospital.
2. No training of staff.
3. In adequate protective gear for waste handlers.
4. Open air burning of infectious and pathological waste.
5. No treatment of liquid waste.
6. Improper transportation of plastic waste (fish cart) and improper disposal of this waste.

Positive Points:
1. Hospital Administrator was very co-operative in providing information about the hospital.

Madras Medical Mission:
This is a 200 bedded, heart institute with a super specialisation in paediatric cardiology.

Waste Management within the Hospital:
a. Nursing Station:
Waste is segregated at the point of generation and a system of colour-coded segregation of waste has been implemented. All kinds of waste including small amount pathological tissue is generated by the hospital. The staff dispose of needles by recapping them and putting them in a puncture proof container. Tissue waste is collected and sealed with Formalin in containers and sent to the Crematorium for final disposal by Deep Burial (6 feet).

Laboratory waste and plastic waste is autoclaved before disposal. Operation Theatre (OT) waste is considered infectious and is disposed off through a channel (that runs through the length of the hospital) to the ground floor where it is collected and disposed finally. The channel is disinfected and fumigated weekly.

Blood bank: Waste from the Blood Bank is also segregated and infectious waste is autoclaved. Instruments like Culture plates are autoclaved and reused. The samples to be discarded are autoclaved and disinfected before disposal.

b. Transportation within the hospital:
The waste is collected from the wards once a day. A team consisting of the Housekeeping Superintendent, a Security officer and 2 workers collects the waste from the wards. The waste is collected in a colour-coded trolley and the workers use protective gear like masks, gloves and a cap while collecting waste. This segregated waste is weighed separately and a record of the same is maintained for on a daily basis. All staff have been immunised for Hepatitis B virus.

c. Main Bin:
The main collection is in situated to one side of the hospital. All the waste is collected in colour-coded bins after weighing and separate bins have been provided for autoclaved waste of each kind. Here the waste is autoclaved and sharps are disinfected in a 20% Hypochlorite Solution and shredded. Sharps are weighed before shredding. Indicator tabs are used to differentiate between autoclaved waste and the waste yet to be autoclaved. General waste is disposed off with the Municipal waste collectors and the non-infectious plastic waste is sold to a contractor.

d. Treatment Facility:
1. Autoclave and Shredder:
This hospital is one of the few in the city who have a dedicated waste autoclave. All infectious waste is autoclaved except pathological tissue, which is sent for Deep Burial. The autoclave is located near the Main bin. The waste is weighed here before autoclaving. The attender operating the shredder has been given a pair of thick gloves, an apron, boots and special protective glasses. The autoclave is put through a Spores test every week, the results of which are examined by the Microbiology laboratory and the autoclave is also inspected every fortnight. This is to ensure that all the waste is being completely sterilised.

Positive Points:
1. Segregation of waste at source or at the point of generation.
2. Sharps Management.
3. Training of staff including doctors.
4. No incineration of waste. A dedicated waste autoclave as well as a shredder for plastics and sharps.

Madras Veterinary College and Hospital:
This is a hospital for animals with limited in-patient facilities.

Waste Management within the Hospital:
a. Nursing Station:
The waste generated here can be classified as – pathological waste, infectious waste like cotton and dressing, sharps and animal excreta and bedding. Bedding is disposed along with the general waste and the excreta washed off everyday using Lizol or Phenyl. The waste generated at the Out-Patients clinics consists of sharps, cotton, bandages and dressing. A system of segregation of waste on the basis of infectious and non-infectious waste has been initiated in the hospital's Out-patient (OF) clinics. Sharps are recapped increasing the chances of needle stick injuries among the attenders and doctors.

The work area is cleaned with Dettol for small animals and with Lizol and Phenyl for larger animals. Sinks and Urinals are cleaned with Hydrochloric Acid and soap at the end of the OP session each day. The In-patient rooms for smaller animals is cleaned everyday using Dettol while the In-patient areas for larger animals is to be kept clean by the owner of the animal himself as he is required to stay with the animal for the duration of the stay at the hospital.

Laboratory samples are autoclaved before disposal. The instruments used are autoclaved and sterilised before reuse. Radio isotopes are disposed off using a "Dilute and Discard" system of disposal.

Waste from the Operation Theatre is taken directly to the incinerator.

As autopsies are performed in the hospital (in a separate room) the carcasses are cut into small bits and sometimes put into plastic bags and disposed at the dump yard. The work area in this room is decontaminated with disinfectant and the walls and the floors are decontaminated using a Flame gun. Instruments are autoclaved, washed and sterilised.

Blood bank: Though the hospital does not have a Blood Bank, and blood contaminated plastic is decontaminated using Dettol and Phenyl.

b. Transportation within the hospital:
The waste is transported from the wards using trolleys. Protective gear – impregnable gloves, have been provided to all the technicians and waste handlers. The waste handlers also use disposable masks, which are disposed at the end of each day.

Hospital staff have also been provided with cloth masks which are to be washed and reused.

c. Main Bin:
The waste generated is either disposed off at the incinerator or along with the waste that is disposed off at the government allotted dump yard at Kodungaiyur. The infectious waste generated is incinerated.

Final disposal of waste was a problem but the College has now purchased a van that is used to transport the waste to the dump yard at Kodungaiyur. The college is proposing to line the inside of the disposal van with stainless steel to increase the durability of the van but this is yet to be implemented. The Ambulance and the van are disinfected regularly with Phenyl.

d. Treatment Facility:

1. Incinerator:

The incinerator is a single chambered incinerator located in the rear part of the campus near the In-patients wards and is housed in a small shed that is kept locked. All Operation Theatre waste is incinerated. The waste is fed into the incinerator on a daily basis through a small opening on the side and the incinerator is run once a week or as and when it is necessary. Protective gear has been provided to the operators of the incinerator.

2. Autoclave:

The hospital does not have a dedicated autoclave for waste but each department has been provided with an autoclave to sterilise the instruments before disposal. The samples that are to be disposed from the Microbiology and Pathology laboratories are autoclaved before disposal.

Major Drawbacks:

1. Partial segregation of waste.
2. Due to partial waste segregation, sometimes, plastic waste is also incinerated.
3. No formal training for waste handlers.
4. Incinerator is single chambered.

Positive Points:

1. Management is open to bettering the present system of Bio Medical Waste Management and Disposal.
2. A system of waste segregation has been initiated.
3. All laboratory waste is autoclaved before disposal.
4. The doctors are knowledgeable on proper Bio Medical Waste Management practices.

Malar Hospital:
This is a 250 bedded, Multi–speciality private hospital.

Waste Management within the Hospital:

a. Nursing Station:
A system of waste segregation is followed in the hospital. Labelled bins indicate the kind of waste to be disposed in them. Syringes are shredded and the infectious waste is incinerated. Pathological waste is collected and incinerated separately. Waste is collected once a day from the wards. Waste from the Operation Theatre (OT) is disposed off through incineration while gloves from the Operation Theatre are disposed off with the general waste. Housekeeping staff use gloves while collecting the waste from the wards. Needle cutters have been provided in order the treat sharps.

Liquid waste is discharged into the drains directly without any treatment. Soiled linen is disposed off along with the general waste.

Blood bags to be disposed off are autoclaved and incinerated. Linen is sent outside the hospital to laundry.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported within the hospital using trolleys. Attenders collect the waste once a day. Attenders use gloves while handling the waste.

c. Main Bin:
The main bin is located behind the hospital and the waste is collected from there by the Municipal waste collectors. A lorry collects the waste from the premises. Incinerator ash is also disposed off along with the Municipal waste.

d. Treatment Facility:

1. Incinerator:
The incinerator, which is a double chambered incinerator with temperature controls, is situated on the 7th floor terrace of the hospital. All infectious waste as well as OT waste and body parts are incinerated. The incinerator reaches a maximum temperature of 1056 °C.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. Partial segregation of waste.
2. Lack of training of staff.
3. Lack of awareness among staff of on the hazards of Bio Medical Waste.
4. Liquid waste not treated before disposal.

Positive Points:
1. Staff very helpful in providing information.

Mediscan Clinical Laboratory and Surendra Genetic Lab:
This is a private laboratory and research centre.

a. Waste Management within the Laboratory:
The waste generated and segregated by the Blood Bank includes pathological waste, blood-contaminated cotton waste, blood, media specimen, pus, aspiration fluid and other kinds of body fluids as well as sharps and plastic waste. The laboratory has biochemistry, microbiology and pathology laboratories. Waste is segregated into general waste and infectious waste. General waste includes food waste and packaging material while almost all other waste generated by the laboratories is regarded as infectious waste.

Collection of blood for tests is done using vaccutainers and therefore syringes and needles are rarely used. All specimen collection containers and swabs are autoclaved before disposal. Vaccutainer needles are destroyed using a needle destroyer before disposal.

From the laboratory, all media specimen and cultures are autoclaved before disposal. Plastic petridishes used in tests are first autoclaved and then disinfected in a concentrate Hypochlorite Solution before disposal with the Municipal waste. Tissue paper that are used in the tests of chance to come in contact with and instruments being used in performing tests are disinfected in Hypochlorite Solution kept near the work area before disposal. Blood samples that are to be disposed are first disinfected in a concentrate Hypochlorite solution and then put in a container that is taken to the washing room. This is then discharged into the drains and the other waste collected from the labs like tissue paper is disposed off with the Municipal waste. Slides and gloves that have been used once are first disinfected chemically and then either reused or discarded along with the Municipal waste.

Spill Control Protocol: The procedure followed for treatment of spills is to first contain the spill with concentrate Hypochlorite Solution and gauze. This gauze is autoclaved before disposal.

b. Transportation of waste:
Waste is transported within the laboratory by attenders who wear protective gear while handling the waste. The waste is carried to a Municipal bin nearby and disposed off.

c. Treatment Facility:
1. Autoclave:
Infected blood units are stored and autoclaved once a week and then disposed.

Major Drawbacks:
More training is to be given to attenders and the staff to emphasise the seriousness of the issue of Bio Medical Waste management.

Positive Points:
1. Doctor in charge of the Blood Bank is very knowledgeable on the issue of Bio Medical Waste and has successfully initiated a system of segregating and handling the waste generated.
2. No incineration of waste is done.
3. All waste is autoclaved before disposal.
4. Spill Control Protocol is in place.

Public Health Centre:
It is run by a private trust and is a general hospital with about 120 beds.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a very basic 2-bin system of colour coded waste segregation. One bin for infectious waste and another for general waste. Waste is collected from the wards once a day. The plastic waste is collected separately.

Liquid waste from pathology is disinfected with chloride solution before disposal into the Drainage system.

Blood bank: The hospital does not have a blood bank.

b. Transportation within the hospital:
The waste is collected in dustbins and then transported outside to the corporation dustbin once a day. Plastic waste is sold to a contractor.

c. Main Bin:
The main bin is the corporation bin, which is situated outside the hospital. All the general waste is transferred to the main bin. Sharps are cut and are buried along with the syringes within the hospital campus in a pit about 2 to 3 feet deep. The plastic waste goes to a contractor.

d. Treatment Facility:
1. Incinerator:
The hospital has a double chambered electric incinerator but since it does not comply with the standards prescribed, it is not in use. Hazardous waste is given to the Municipality for disposal along with the other waste.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. They do not provide protective gear for their staff working in labs as it was reported to be cumbersome.
2. Inadequate system of segregation of waste.
3. No training of staff.

Positive Points:
1. The maintenance of the current system is good even though they do not follow sophisticated disposal techniques.
2. Regular meetings are held that discuss the any kind of discrepancies in the handling and disposal of sharps that have been noted by the staff. The aim of these meetings is to ensure that disposal of needles is carried out an efficient manner and also to prevent pilferage.

Royapettah Government Hospital:
This is a 712 bedded, Multi–speciality Government Hospital.

Waste Management within the Hospital:
a. Nursing Station:
No segregation of waste is followed. All the waste generated including infectious waste and sharps are collected in plastic bags which are sent to the common collection disposal area. The staff nurses are aware of the Rules.

Liquid waste is disposed off directly through the drains.

Blood bank: The hospital has a Blood Bank. There is no segregation of waste here and all the waste is disposed off into the main bin. The bins are cleaned with soap by the hospital workers before reuse.

b. Transportation within the hospital:
The waste from the wards is transported to a common collection disposal area in the plastic bags in which they are collected. The waste handlers who transport the waste have not been provided with protective gear. The waste is collected and disposed at the main bin.

c. Main Bin:
The main bin is located behind the hospital building where all the waste is collected. The waste is disposed off with the Municipal waste collectors who come into the hospital and collect the waste.

Gloves have been provided only to the Operation theatre staff, lab technicians and the toilet cleaners.

Major Drawbacks:
1. No segregation of waste.
2. No protective gear is provided to the staff who handle the waste.
3. No treatment is given to liquid waste before disposal.
4. Waste handlers not given adequate training in Bio Medical Waste Management methods.

Positive Points:
1. Administrative Officer of the hospital very knowledgeable on the issue of Bio Medical Waste.
2. Hospital personnel have been given training on Waste Management methods.

Sankar Netralaya Hospital:
This is a 231 bedded, Eye Hospital.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a basic system of segregation of waste. The waste bins are kept in the Janitor's room have 3 separate bins for infectious cotton waste, general waste and bottles. Sharps and syringes are disposed in a container containing a mild bleach solution. They are finally destroyed at a common area using a needle destroyer.

Laboratories follow the same system of segregation of waste.

Blood bank: The Hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported within the hospital using colour-coded trolleys. Protective gear has not be provided to the staff who transport the waste. Staff have been vaccinated with Hepatitis B vaccine, especially Operation Theatre staff.

c. Main Bin:
The main bin is located behind the hospital and only general waste is disposed off here. The infectious waste is taken directly to the incinerator and the sharps along with the plastic waste is collected by a contractor.

Non infectious plastic waste is given to a contractor – he segregates the waste and it is then inspected by the housekeeping staff before he takes it away. The Housekeeping staff make sure that the waste handed over cannot be refilled and reused.

d. Treatment Facility:
1. Incinerator:
The incinerator is a double chambered incinerator located behind the hospital building. The infectious waste like cotton, dressing and gauze and so on is incinerated. The incinerator does have temperature controls and is operated for about 2 hours a day. The operator of the incinerator has been provided with protective gear like a rake for collecting the ash and boots and gloves. The ash is disposed off along with the Corporation waste.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. The segregated bins are not easily accessible as they are kept in the Janitor's Room.

Positive Points:
1. A system of segregation has been initiated by the hospital.
2. The staff are aware of the system being followed in the hospital.
3. Vaccination of Operation Theatre staff.
4. Staff very helpful in providing information about the system in place.

Sri Ramachandra Medical College and Hospital:
This is a 1090 bedded, Multi–speciality private hospital.

Waste Management within the Hospital:

a. Nursing Station:
The hospital generates all kinds of waste and follows a system of segregating waste into infectious, plastics, sharps and general waste. The nursing stations have been provided with different bins for each type of waste and needle cutters and puncture proof containers for the treatment of sharps. Garden waste is also collected separately and used as manure.

Liquid waste is disinfected at a common sewerage system with a 1% Hypochlorite solution and discharged into the drains. A "Delay and Decay" system of disposal is used for Radio Isotopes used in the treatment of cancer patients.

Blood bank: The waste generated here is segregated as per the segregation system followed for the rest of the hospital. Metal clips are used to seal the bags. The hospital follows a system of disinfecting spills with Hypochlorite solution. All infectious plastic is disinfected with 1% Hypochlorite Solution and then disposed off with the rest of the plastic waste.

b. Transportation within the hospital:
The waste is collected from the wards using colour-coded bins in trolleys. This waste is then taken to the common collection area through colour coded trolleys by the housekeeping staff. The waste is then transported to the ground floor in colour coded trolleys to the area behind the hospital and weighed. Protective gear – gloves, mask and a cap, has been provided to waste handlers.

c. Main Bin:
The common collection area is located in the ground floor of the hospital and the waste is kept in colour-coded bins. As different kinds of waste are subjected to different treatments of disinfection and disposal, each kind of waste is either sent for deep burial, incineration, hydroclaving or shredding from here.

d. Treatment Facility:

1. Incinerator:
All infectious waste is incinerated and the ash buried on campus. Needles are also incinerated and then sent for deep burial on the premises. These pits are lined with lime as well to ensure disinfection.

2. Hydroclave and Shredder:
All plastic waste is segregated into plastic that can be recycled and those that cannot be recycled and then sent for hydroclaving and shredding. Those that can be recycled are then given to a contractor and those that cannot be recycled are discarded.

Major Drawbacks:
1. When contacted initially some of the system had not been functioning for a short period of time and we were advised to come back later for a full review of the system.

Positive Points:
1. Segregation of waste.
2. Treatment of liquid waste and plastic waste.
3. Segregation, Hydroclaving and Shredding of plastic waste.

St. Isabel Hospital:
This is a 275 bedded, private Multi-speciality hospital.

Waste Management within the Hospital:
a. Nursing Station:
Segregation of waste is being carried out using a system of labelled bins in the Nurses' Station. These bins are periodically replaced when full. All bins have been lined with plastic bags and are covered by cardboard. All the wards have a common bin. Needles are being segregated in a puncture proof container. Needle cutters have been provided in the laboratory, the Operation theatre as well as the ICU. Some waste is also collected in metal trays and disposed. Waste is collected in the Labour room in a steel bucket, which is washed regularly.

Liquid waste is discharged directly into the drains.

The attenders in charge of disposal of waste have been provided with gloves for this purpose. These gloves are autoclaved and reused.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
The waste is transported from the wards to the final disposal area using trolleys with segregated closed containers by the housekeeping staff. Protective gear is used by the wardboys. These gloves are autoclaved and reused. Plastic waste is sold to a contractor.

c. Main Bin:
The main bin is located near the incinerator behind the canteen. The waste collected in this area is that that which has been incinerated and that which can be disposed off along with the general waste. Incinerator ash is disposed off through the Municipality. Waste that is to be autoclaved is sent to the autoclave directly.

d. Treatment Facility:
1. Incinerator:
The hospital has a Multi-chambered incinerator that is used to dispose off of infectious waste including placenta and dead foetuses. Protective gear has been provided to the operator of the incinerator.

2. Autoclave:
The autoclave is situated in used to sterilise urine bags, catheters and blood bags. Gloves are also autoclaved before reuse or disposed off through incineration.

Major Drawbacks:
1. Although the hospital has adopted a colour coded system of waste management, monitoring of staff is not adequate.

Positive Points:
1. The hospital is very well maintained with very efficient staff.
2. The staff were very helpful and co-operated with us during our survey.
3. They are open to changes and are willing to learn and get trained in waste management techniques.

Stanley Medical College and Hospital:
This is a Multi–speciality government hospital.

Waste Management within the Hospital:

a. Nursing Station:
No system of segregation of waste is followed. All the waste is disposed in a single bin which is kept in the wards or in the lobby. Staff seem to be unaware of the issue of Bio Medical Waste.

Blood bank: No system of segregation of waste is followed here either.

b. Transportation within the hospital:
The waste is disposed at the final disposal area in the hospital using trolleys and bins. The staff do not use any protective gear while handling the waste and report having sustained needle stick injuries often.

c. Main Bin:
There is no specific bin where all the waste is dumped but the waste is dumped in a Corporation bin situated behind the hospital building. The waste was dumped in the bin as well as for about 15 feet in front of the bin. The waste from the surgical block is disposed though channels running through the length of the building. Waste was noticed hanging from these channels and they are also being used as urinals. The waste contained blood and urine bags, blood sets and tubing, IV sets and cotton soaked bandages. Staff report that the municipal waste collectors clear the waste from this area.

d. Treatment Facility: None

Major Drawbacks:
1. Open dumping of waste.
2. No segregation of waste.
3. No training of staff.

Sundaram Medical Foundation:
This is a 150 bedded, Multi–speciality private hospital.

Waste Management within the Hospital:
a. Nursing Station:
A system of segregation of waste on the basis of colour-coded bins is being followed. The waste is segregated at the Nursing Stations and Puncture proof containers have been provided for sharps and in some places needle cutters have been provided for cutting the sharps. The staff is aware of the waste management practices being followed in the hospital.

Liquid waste is collected in a sump and disinfected with Bleach before disposal into the drains.

Laboratory waste is disposed off with the infectious waste and the OT waste is also disposed off with the infectious waste.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Waste is transported from the wards to the collection area through trolleys with large colour-coded bins by the housekeeping staff. Protective gear has been provided for the staff handling waste disposal.

c. Main Bin:
The main bin is located in a shed in the ground floor to one side of the hospital. The municipal waste is kept here in sealed black plastic bags and the municipal waste collectors collect the waste from here.

d. Treatment Facility:
1. Incinerator:
The incinerator is located on the 6th floor terrace and is single chambered. Infectious waste like cotton and dressing are incinerated. The ash from the incinerator is collected and disposed of with the municipal garbage. Protective gear has been provided to the operator of the incinerator. Pathological tissues are send to the crematorium for final disposal.

2. Autoclave:
The infectious plastic waste and sharps are collected at a shed on the ground floor which house the autoclave and the shredder. The autoclave is checked regularly with chemical indicators to ensure proper sterilisation of waste. Needles and syringes are shredded in a shredder. The operator of these instruments has been provided with protective gear.

Major Drawbacks:
1. Incinerator is single chambered.

Positive Points:
1. A system of management of Bio Medical Waste is being practised.
2. Dedicate autoclave for waste.
3. Sharps management initiated.
4. All plastics autoclaved.
5. Training was imparted to all hospital staff

Trinity Acute Care Hospital:
This hospital is a 60 bedded Cardiology hospital, which also specialises in trauma care.

Waste Management within the Hospital:
a. Nursing Station:
The hospital follows a system of colour coded segregation of waste. Each ward has containers in which different kinds of waste are collected. It was however observed that the system was not being followed completed.

The liquid waste is collected in a special chamber and treated with disinfectants like chlorine and bleach and then disposed off through the Drainage system.

Blood bank: The hospital does not have a Blood Bank.

b. Transportation within the hospital:
Each ward has containers in which waste is collected and this is stored in a building outside the hospital. There is a trolley fitted with colour-coded bins for collecting the waste, and this waste is transported to the bin outside.

c. Main Bin:
The main bin is located outside the behind the building and all the waste generated in the hospital is transferred to the main bin in a trolley. The main bin however is not segregated for the different kinds of waste generated.

d. Treatment Facility:
1. Incinerator:
The hospital has an electrical incinerator on campus manufactured by the Essco Company. It is situated on the terrace. The incinerator is preheated for about 15 minutes in order to avoid unburnt waste. The waste which is incinerated consist of dressings, infectious, blood components, soiled bandages, cotton swabs, sanitary pads, pathological waste, tissues, and placenta. Hazardous waste is also incinerated. Small body parts are fed into the incinerator while the bigger body parts are sent to the Corporation burial ground. The incinerated ash is collected and disposed off through the drains along with disinfected liquid waste.

2. Autoclave:
The hospital has a dedicated waste autoclave. All plastic waste is autoclaved and disposed off through the Municipal Waste collectors.

Major Drawbacks:
1. Although the waste disposal system seems to be well planned it is not up to the expected standards.
2. No training of staff.

Positive Points:
1. Segregation of waste through colour coded bins has been initiated.
2. The staff is provided with vaccination facilities to protect them from diseases that could be caused through needle prick injuries.

The Guest Hospital:
This is a 50 bedded, Super–speciality hospital.

Waste Management within the Hospital:

a. Nursing Station:
Each room in the hospital has been provided with dustbins covered with polythene bags. These dustbins are mainly provided for the disposal of dressings. These dustbins are then transported to the main disposal area.

The liquid waste is disinfected and then disposed through the drain.

Blood bank: the hospital does not have a blood bank.

b. Transportation within the hospital:
Since we could not tour the hospital due to the absence of the administrative officer it was not possible to find out the mode of transportation used inside the hospital.

c. Main Bin:
The waste collected in the dustbins kept in the rooms is sent to a main area and disposed off from there.

d. Treatment Facility:

1. Incinerator:
There is a manually operated incinerator on campus. It is used to burn the needles. The persons operating the incinerator wear gloves as protective gear. The incinerated ash is disposed through the corporation dustbin.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. The information provided was not sufficient enough to draw concrete solutions.
2. No method of segregation of waste is being followed.

Positive Points:
1. Although they are not following a proper waste disposal method as yet they are managing the waste quite efficiently.

Vijaya Hospital:
This is Multi–speciality private hospital.

Waste Management within the Hospital:
a. Nursing Station:
Segregation of waste is being carried out on a colour-coded basis. The waste is segregated as infectious waste, plastic and glass waste and non-infectious plastic waste. Sharps are destroyed using a needle cutter in all wards. The syringes are then disposed along with the general waste. Placenta is collected by the wardboys but the nurses were not sure where this waste is taken or how it is disposed.

Liquid waste is disinfected before discharging it into the drains.

Blood bank: The hospital does have a Blood Bank. The waste generated in the Blood Bank is segregated according to the colour-code followed by the rest of the hospital. Blood bags are disposed off with the infectious waste.

b. Transportation within the hospital:
Waste is transported from the wards to the common collection area in secured plastic bags by the wardboys. The wardboys do not use protective gear while transporting waste. The operator of the incinerator only uses protective gear.

c. Main Bin:
The main collection area is situated near the entrance gate of the hospital. All waste other than infectious waste is brought here and collected from here by the Municipality.

d. Treatment Facility:
1. Incinerator:
The hospital has a double chambered incinerator, which is used to incinerate waste like human tissues, body parts and other infectious solid waste. The ash collected from the incinerator is buried in a landfill near (opposite) the hospital, near the Health Centre.

2. Autoclave:
Hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No treatment of infectious plastic waste before disposal.
2. Open dumping of waste at the common collection area.
3. No training of staff though nurses are aware of the system in place through the charts put up.

Positive Points:
1. Liquid waste is disinfected in a separate sump before discharge into the drains.
2. Segregation of waste.
3. Initiated sharps management.

Voluntary Health Services Hospital:
The hospital is a 405-bedded Multi–speciality charitable hospital.

Waste Management within the Hospital:

a. Nursing Station:
The hospital does not follow a system of waste segregation. All the waste is dumped in a single bin in the wards. These bins are cleared and carried to the final disposal site by the housekeeping staff on a daily basis.

Needle burners has been provided in the Nursing Stations to burn the tips of needles to prevent reuse. Certain syringes are reused after sterilisation.

Laboratories have also been provided with needle burners and the syringes are stored in the waste storage area of the laboratory. Liquid waste from the laboratory is disinfected with Sodium Hypochlorite before discharge into the drains.

Blood bank: The blood bank does not follow a system of segregation of waste either. Blood Bags are burnt by the hospital staff. Instruments like catheters are disinfected with Sodium Hypochlorite. Blood that is to be discarded is discharged into the drains directly without treatment. Samples that are to be discarded are disinfected and then discarded.

b. Transportation within the hospital:
Trolleys have been provided to transport the waste to the disposal area. No protective gear has been provided to the staff handling the waste.

c. Main Bin:
The waste from all the wards is dumped near the compound wall. All kind of waste is dumped here and the municipal waste collectors collect the waste from there. The staff has not been provided with any protective gear for handling the waste.

d. Treatment Facility:

1. Incinerator:
The hospital has a single chambered incinerator but it is not operational.

2. Autoclave:
The hospital does not have a dedicated waste autoclave.

Major Drawbacks:
1. No segregation of waste.
2. No training to the staff on Bio Medical Waste Management.
3. No proper mode of transport of the waste.
4. No treatment of liquid waste before disposal.

Positive Points:
1. Sharps management has been initiated by the hospital.
2. Administrative Officer of the hospital was very co-operative in providing information about the systems in place.

Analysis of Survey Findings:

During the Phase-1, Srishti-CAG study on hospital waste management practices in Chennai during May-June 2000, it was apparent that of the 17 hospitals and 2 laboratories surveyed, a very large proportion of the hospitals did not follow even basic waste management practices like segregation. Very few hospitals knew about the existence of the Bio Medical Waste (Handling and Management) Rules, 1998 that stated that the authorities could shut down the healthcare facility for non-compliance with the Rules.

CAG forwarded a copy of the findings of the preliminary survey to the respective hospitals and laboratories, and offered assistance to upgrade their bio-medical waste management practices. Some of the hospitals did seek such assistance, though most of them did take their own steps to upgrade their waste management practices in their premises.

In Phase-2 of the study, CAG decided to revisit these very hospitals and laboratories to evaluate their success at handling and managing bio-medical waste. Encouraged by the findings of the preliminary survey, it was decided that this time, the study would be conducted in atleast 50 healthcare service providers in Chennai City. Despite our best efforts, we were allowed to conduct the study in only 45 such centres - 40 hospitals (including 1 veterinary hospital), 2 blood banks and 3 laboratories. Several others, though approached by CAG volunteers and staff either declined to let us study their Bio Medical Waste Management systems or were only willing to give us information on the system but did not let us see the hospital or talk to their staff[1]. From the Phase-1 list of 19 healthcare institutions in which the survey was conducted, we were able to review the system in only 18 of these hospitals[2].

Nine out of the initial 17 hospitals surveyed last year have shown drastic improvements in the systems that have been implemented – these include hospitals which had very poor systems of Bio Medical Waste Management last year like Malar Hospital, Child Trust Hospital, Mehta Nursing Home and Vijaya Hospital which have since initiated systems in their hospitals. This list also includes hospitals like Madras Medical Mission and Shankar Nethralaya, that have made a number of small, but significant changes in their systems being followed.

Unfortunately, no government hospital has shown any improvement in the way they manage their waste – no changes have been implemented to handle and dispose the waste and the awareness levels among the staff of these hospitals especially the waste handlers remains extremely low.

Out of the two laboratories in which the survey was conducted last year, it was found that Ehrlich laboratories has since implemented a good system but are still grappling with monitoring problems. As a result there still remain certain inadequate practices followed while handling the Bio Medical Waste.

In the remaining 22 hospitals, that were being surveyed for the first time, it was found that more than 75% of these healthcare service providers did not carry out basic segregation

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[1] We were not allowed to conduct the Survey in Kumaran Hospital, Aysha Hospital, Dr. Agarwal's Eye Hospital, and Asvini Soundara Nursing Home. We were not allowed to look around the facility in G G Hospital, K J Hospital, Chennai Kaliappa Hospital and Public Health Centre, T. Nagar.

[2] We were not allowed to review the system in Harvey Heart Hospital.

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of their waste and some of these followed a system of partial segregation of their waste. This was due to the inadequate training of staff and the lax monitoring by the hospital management or both.

Sharps, which are a small proportion of the waste but yet, a highly hazardous category was being dealt with in a variety of methods. Few hospitals like Sri Ramachandra Medical College and Hospital, Madras Medical Mission and Sundaram Medical Foundation used needle cutters or destroyers for the needles and syringes and then disinfected them in Hypochlorite. Some other hospitals including government hospitals disposed these sharps directly along with their general waste without disinfection or mutilation. These sharps have been proven to be the cause of fatal diseases like HIV in many countries and as reporting of these injuries in most hospitals is almost nil, there are a large number of cases that remain uncounted. This non-reporting of cases in many hospitals is due to inadequate education by the hospital for their staff on the hazards of improper handling of the waste.

On the issue of transportation of waste within the hospital, it was found that most hospitals did have a system of transporting the waste manually from the wards and the Operation Theatres to the main collection area where the waste was deposited in a single bin. Spillages and accidents while transporting waste and contamination were common and not accounted for in most hospitals. This drew our attention to the lack of emergency protocol in these hospitals. Almost none of the hospitals have provided their staff with protective gear that should be compulsory while handling and transporting waste.

Out of the 45 institutions in which the Phase-2 survey was conducted, it was found that ten had double-chambered incinerators and about twelve had single-chambered incinerators. Only 3 of the double chambered incinerators were found to be in compliance with the standards. It was found that in some hospitals, unsegregated waste and even plastic waste was being incinerated. This is a very dangerous practice as in a in these cases, plastic waste like gloves remain unburnt and could therefore contain a number of harmful micro-organisms and pathogens. The burning of these plastics can also led to the emission of dioxins and furans which are serious health hazards even when inhaled in small quantities.

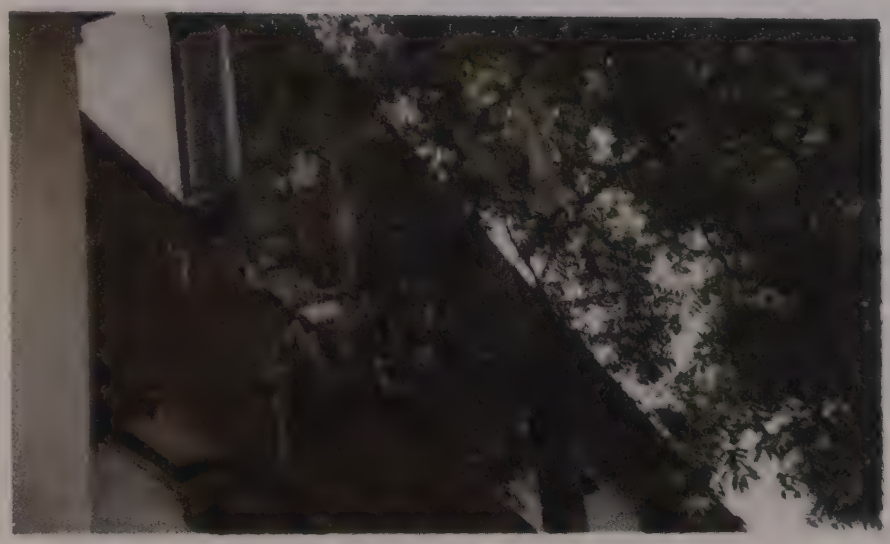
Few healthcare providers like Jeevan Blood Bank and Lister Laboratory have discontinued the use of their incinerator following complaints from the residents in the area of a bad smell. Some others like Sundaram Medical Foundation have increased the length of their Chimney to ensure against this problem.

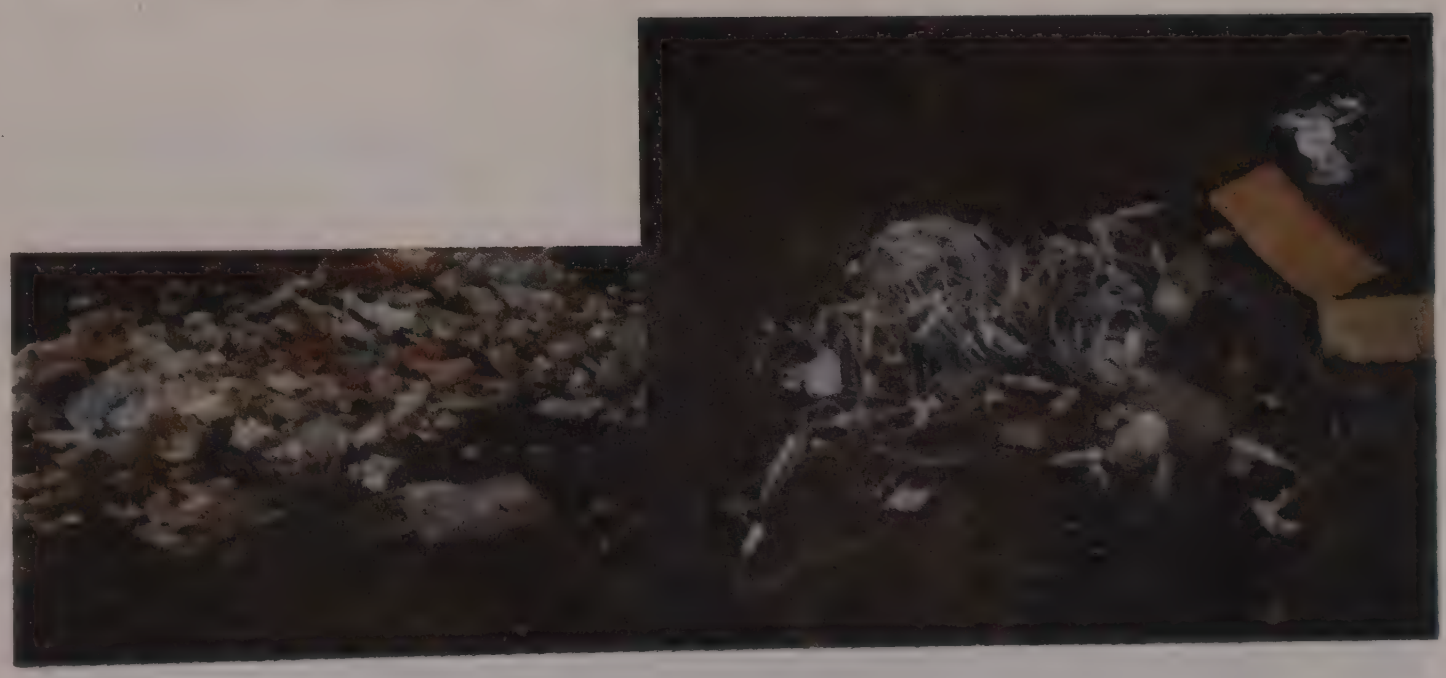
Training which is a vital part of the success of any system was found to be the most widely neglected of all the factors. The lack of formal training of the housekeeping staff and nursing staff and inadequate monitoring and supervision of the practices being followed was in many cases found to be the main problems in successfully implementing the system adopted by the hospital.

Vaccination of staff especially those who handle waste is another aspect that is not given importance in the context of a waste management system. Few hospitals like the Communicable Diseases Hospital, which deals only with highly infectious diseases, were found having a system of regular vaccination of their staff. Thus exposing their staff to not only a high risk of contracting diseases but also inadequate healthcare given the

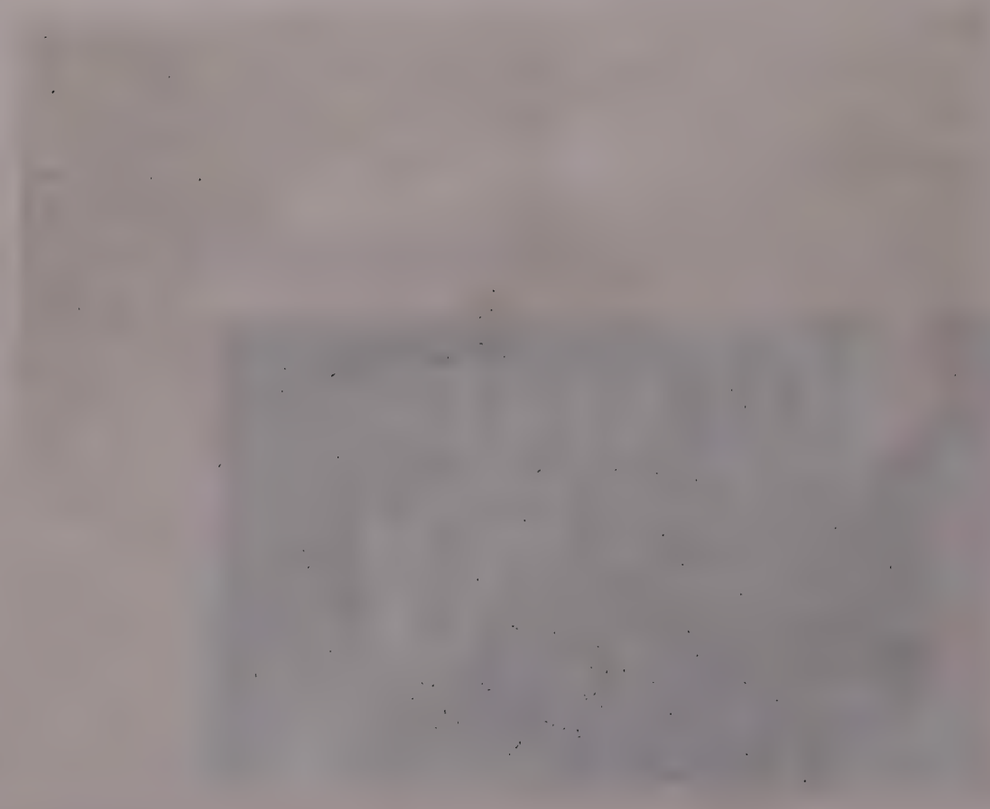
circumstances of their job. This increases the occupational hazard factor multi-fold and could be the cause of rampant spread of any disease.

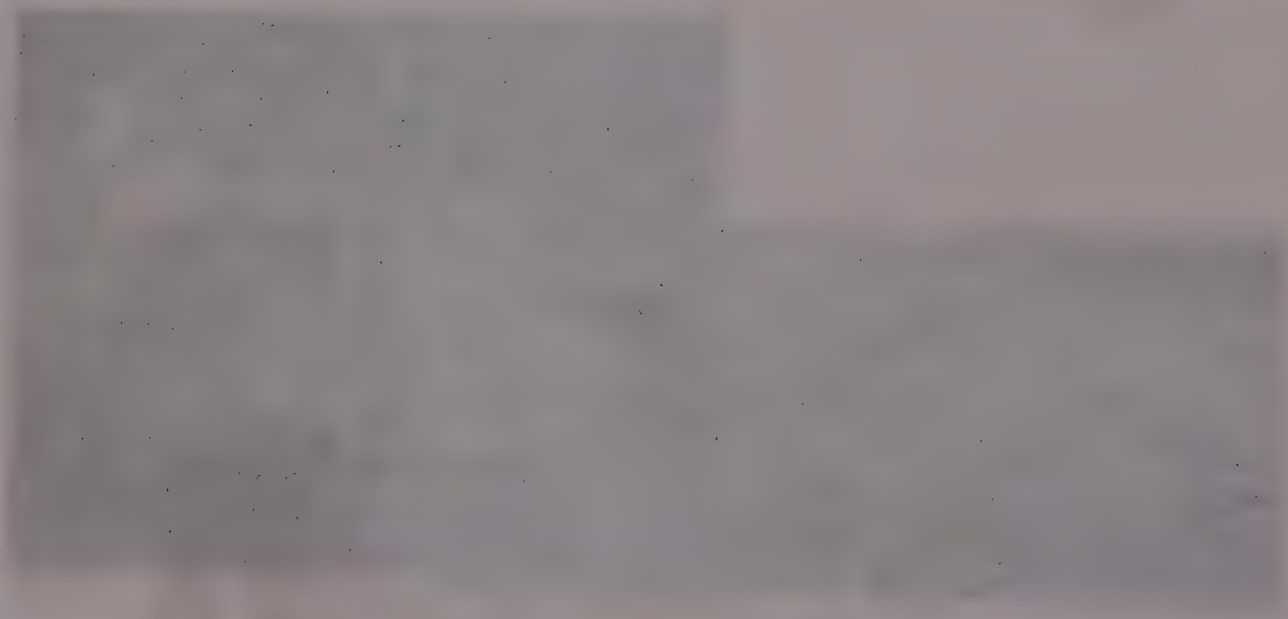
DANGEROUS PRACTICES





Infectious bio-medical waste carelessly strewn around a common sight in many healthcare institutions especially Government hospitals.





A rag-picker rummaging through the waste of a Government hospital, putting himself in danger of infection

BEST PRACTICES

Systematised segregation

A plastic waste and needle shredder in operation

Autoclaved sterile waste ready for disposal